Episode Book

EPISODE #6121

Hearing Speech in Noise: What Actually Works

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SYNOPSIS

You pass the hearing test. You still can't follow the conversation at the next table over the espresso machine. This episode digs into the gap between what hearing devices are legally built for — perceived mild-to-moderate hearing loss — and the problem of speech-in-noise difficulty in people with clinically normal hearing. We walk through HearAdvisor's lab scores showing over-the-counter aids collapsing in noise, Apple's Conversation Boost hitting up to 7.2 dB of signal-to-noise advantage for a talker directly in front, and a $6,800 neural-network aid that produced the best background-noise performance ever measured — with caveats. Then the harder finding: in the one study targeting normal-audiogram speech-in-noise complainers, 5.4 dB of measured improvement wasn't enough to keep 12 of 17 participants wearing the devices. Plus: why QuickSIN measures what pure-tone audiometry can't, and what the ADHD speech-processing research suggests about rooms full of language.

TRANSCRIPT



Corn

The espresso machine goes quiet. The grinder goes quiet. And then the woman at the next table starts telling her friend about her divorce, and you can hear every word.



Herman

It's the one thing noise cancelling has never solved. The electronics handle the low rumble, and the seal handles the rest, and speech just walks straight through both.



Corn

Daniel's been circling this one for a while. We've done blocking sound out to death. Earplugs, earmuffs, NRR ratings, everything. And he says we hit a wall in the café episode, because the headphones kill the machine and leave the conversation at the next table perfectly audible, and none of it helps him hear the person he's actually talking to.



Herman

Which is the other half of the problem.



Corn

So he wants the other half. Devices that make the speech you want louder and clearer instead of turning everything down. What's actually out there now. The over-the-counter hearing aid category, the hearing aid and conversation boost features in AirPods Pro, directional and beamforming microphones, the newer aids running neural networks on-device to separate speech from background.



Herman

And the part that makes it interesting.



Corn

Do any of these make sense for someone like him. Passes a standard hearing test, struggles to follow speech in noisy places, and the difficulty is ADHD-type filtering rather than hearing loss. What an audiologist would actually say about that. Whether there's a test that measures speech-in-noise ability instead of pure-tone hearing. And practically, what's worth trying, what it costs, and the catches. Latency, the occlusion effect, battery life, and looking like you're ignoring people.



Corn

It's doing the most work.



Herman

Here's the mismatch that runs through the whole thing. The FDA created the over-the-counter hearing aid category in October of twenty twenty-two, and it's legally for adults with perceived mild-to-moderate hearing loss. Perceived is the operative word. You can buy them off the shelf, no prescription, no fitting.



Corn

And the person Daniel is describing has a normal audiogram.



Herman

So the category was written for a problem he doesn't have, and the problem he does have isn't in the category.



Corn

How bad is it when you get past that, though. Does the technology work.



Herman

This is the piece that surprised me. HearAdvisor lab-tests these devices on a manikin programmed to a standard moderate hearing loss audiogram, and the scores split hard. Speech in quiet, they're good. Speech in noise, they collapse. The Yeasound RIC800



Herman (continued)

scored four point four out of five in quiet and two point four in noise. Elehear Beyond Pro, three point three quiet, two point five noise. Audicus Omni two, four point two quiet, two point three noise. Elehear Delight, four point zero quiet, one point eight noise.



Corn

So the café is the exact scenario none of them are good at.



Herman

The café is the scenario none of them are good at. And that's not an over-the-counter problem. That's the problem at every price point. Speech in noise is the hard one, and it's been the hard one for fifty years.



Corn

How many people are we actually talking about here. Is this a rare edge case or is this a third of the room.



Herman

Something like thirty million US adults have some hearing loss, and only about a fifth of the people who could benefit from an aid ever go get one.



Corn

And the normal-audiogram group.



Herman

Roughly five percent of people under sixty with clinically normal hearing report real difficulty following speech in noise. And that number understates it, because a normal audiogram is a coarse filter. On speech-in-noise tests, the best ten percent of normal-hearing listeners score around eighty-two percent at minus one point six decibels signal-to-noise. The worst ten percent score thirty-eight percent at the same level. Both of those people pass the same hearing test.



Corn

Both of them get told their hearing is fine.



Herman

And one of them can't follow a conversation in a restaurant.



Corn

So walk me through what the over-the-counter aids are actually doing. Because I think people hear hearing aid and picture something that fixes everything.



Herman

They're air-conduction devices. A microphone picks up the world, the electronics apply gain and directionality, a receiver pushes the sound into your ear canal. Self-fitting through an app. The directionality is the interesting part, because that's the bit doing the work in noise.



Corn

Explain the directional thing properly.



Herman

A directional microphone array is spatially filtering. You have two or more mics, and by comparing when the sound arrives at each one, the device can favor what's coming from in front of you and attenuate what's coming from the sides and behind. It's how conventional hearing aids have attacked noise for decades, and a conventional directional array buys you three to six decibels of signal-to-noise advantage.



Corn

Three to six.



Herman

Which sounds small and isn't. Three decibels is a doubling of speech intelligibility in some conditions. But it only works if the talker is directly in front of you. Turn your head, and the array is now pointing at a wall, and it's boosting the wall.



Corn

So it works in a meeting and fails at a dinner table.



Herman

It works exactly as well as your neck discipline.



Corn

And the AirPods.



Herman

Apple's Hearing Aid Feature is a self-fitting over-the-counter air-conduction hearing aid. Same legal category, same perceived mild-to-moderate framing, eighteen and up, on AirPods Pro two with iOS eighteen point one and now on AirPods Pro three. And here's the number that matters. The National Acoustic Laboratories measured Conversation Boost on its own giving four point three to five point five decibels of signal-to-noise advantage. Ambient Noise Reduction adds about two more. Both together, up to seven point two decibels, for a talker directly in front of you, in a babble environment sitting at minus three decibels signal-to-noise.



Corn

Seven point two beats the three to six.



Herman

Seven point two beats conventional hearing aid directionality, in the lab, for a talker directly in front. That's a real result. It's also a lab result, and it's also the best case. If the person you're talking to is to your left, you're back to normal.



Corn

What about the ones actually running neural networks. That's the part I want to get to.



Herman

Fortell AI. Four microphones, on-device AI source separation, six thousand eight hundred dollars a pair.



Corn

Six thousand eight hundred.



Herman

It produced the best background-noise performance HearAdvisor has measured across more than a hundred devices. The reviewer described its Front Voices setting as a pronounced voice-pop-out effect, and said it went beyond any hearing aid they'd reviewed to that point.



Corn

What's the catch.



Herman

Two. When a sudden sound hits, the processing briefly ducks the entire scene before it recovers. And the closed domes they ship with made the reviewer's own voice sound boomy when they spoke.



Corn

So it solves the room and breaks your own head.



Herman

And that ducking behaviour is worth sitting with, because it's the shape of the whole problem. To pull one voice out of a scene, the system has to decide what the scene is. When it's wrong, it's confidently wrong, and it takes the whole soundscape with it.



Corn

Where's the research going.



Herman

Lower latency, more aggressive separation. There's a paper accepted at IWAENC this year proposing a neural filter that runs at ten milliseconds of latency. Ten milliseconds is the number people care about, because above roughly that, your own voice starts to sound hollow and delayed to you, and lip-reading stops lining up.



Corn

What's it at now.



Herman

Current devices are somewhere in the tens of milliseconds, depending on the processing. Good enough that most people adapt. Not good enough that nobody notices. And there's a second line of work on source counting, where the aid keeps track of how many separate voices are in the room and reallocates its attention as they come and go. That one's at ICASSP this year. Both are lab-stage. Neither is in a product you can buy.



Corn

Let me put the actual question on the table, because I think we've been circling it. Does any of this help the person who passes the test but can't follow the conversation.



Herman

There's exactly one study that goes at that population directly, and it's from twenty twenty-four. They took seventeen people with normal hearing, aged twenty-one to fifty-nine, all of whom reported difficulty hearing speech in noise. Gave them AirPods Pro.



Corn

And.



Herman

Five point four decibels of signal-to-noise advantage. Speech intelligibility up eleven point eight percent in the lab. In the real world, the participants rated them a bit better than without.



Corn

That's a win.



Herman

Five of the seventeen said they'd keep using them.



Corn

Five.



Herman

Five of seventeen. Twenty-nine percent. And the reasons the other twelve gave were limited benefit, discomfort, and stigma.



Corn

So seventy-one percent of the exact population we're talking about tried the thing that measurably helped them and handed it back.



Herman

Handed it back. And the numbers back up that it helped. That's the part I keep turning over. It's not that the device failed. It's that a real, measurable, five decibel improvement wasn't enough to survive how it felt to wear them.



Corn

That's the finding of the episode. Hold on, because I want to get the ADHD piece in before we lose it.



Herman

The ADHD work is thinner and it's a different shape. There's a twenty twenty-three study on young adults with ADHD, and they process speech about a hundred and forty milliseconds slower under high listening load, and they hesitate more. But you only see it with eye-tracking. On the regular offline tests, they look fine.



Corn

The test can't see it.



Herman

And the person can feel it. And there's neuroimaging work from twenty twenty showing ADHD brains desynchronize in the attention networks specifically when the background is other people talking. Not white noise. Speech.



Corn

That's the lot, isn't it. It's not that the room is loud. It's that the room contains language.



Herman

And the brain keeps trying to parse it, and the parsing is the tax.



Corn

Is there anything built for that. Any device, any study.



Herman

Nothing in adults. There's pediatric work on FM systems and mild-gain aids for kids with auditory processing disorder and ADHD, and none of it has been run in adults with ADHD. So the honest position is that the closest evidence we have is that AirPods study, which is normal-audiogram people with speech-in-noise complaints, most of whom probably weren't ADHD-diagnosed at all.



Corn

You're describing a device category that doesn't match the user, evidence that's one study deep, and a seventy-one percent dropout rate.



Herman

And a test that can't see the problem in the first place. Pure-tone audiometry, including Apple's own five-minute test, checks whether you can hear a beep at a frequency. It says nothing about whether you can pull a sentence out of a room.



Corn

What actually measures it.



Herman

QuickSIN is the standard. Six sentences, five key words each, played over four-talker babble, and the signal-to-noise ratio steps down in five decibel increments from twenty-five to zero. What you get at the end is your SNR loss.



Corn

Numbers.



Herman

Normal-hearing adults average an SNR-50 of about two decibels. Mild-to-moderate sensorineural loss averages about eight. So there's a six decibel spread between someone with clinically fine hearing and someone with a diagnosed loss, on the same test.



Corn

Does it take an afternoon.



Herman

Two to three minutes. No sound booth. And there's Words-in-Noise, there's BKB, there's Beck-Benitez, all in the same range.



Corn

So the test exists, it's cheap, it's fast, and nobody runs it.



Herman

Nobody runs it routinely. Which is why the person we're describing spends years being told their hearing is fine.



Corn

What would an audiologist say to Daniel. Straight.



Herman

The likely position is that these devices aren't contraindicated for someone with a normal audiogram and a speech-in-noise complaint, but they're not designed for it either, and the evidence base is one study. And I'd guess a good audiologist would say the same thing we just said. Get the QuickSIN done. It costs nothing, it takes three minutes, and if you're sitting at five or six decibels of SNR loss, you have a number instead of a feeling.



Corn

That's useful and also nobody told me this was an option.



Herman

It's not an option because it's not billable at the volume pure-tone is. That's the whole reason.



Corn

Now.

L

Larry

Are you tired of leaning forward at dinner? Are you tired of smiling and nodding while somebody's telling you something that might have been about their mother's surgery and might have been about their dog? Then you need HearWell Pro Max, the world's first hearing aid engineered entirely by listening. I've been wearing mine for six years. My wife Deborah says I'm a new man. My wife Carol says the same thing. My wife, uh, my wife Susan says it too. HearWell Pro Max. It hears what you mean.



Herman

...Where did that come from.



Corn

I have a theory.



Herman

I did not book that. I want to be very clear that I did not book that, and I want to walk you through my afternoon, because at eleven forty I was in the kitchen making coffee, and then I had a call with the audio guy about the levels on Tuesday, and then I was reviewing the sponsor sheet, which had four entries on it, and none of them were that, and I want to go through the four entries with you one at a time, starting with the first one, which is actually a mattress company.



Corn

Herman.



Herman

It's a mattress company, and they sell a cooling pillow, and I spoke to a woman named Ruth.



Corn

I believe you.



Herman

Do you.



Corn

I believe you the way I believed you about the thing in the shed.



Herman

What thing in the shed.



Corn

The catches. Practical ones.



Herman

Right. Latency, which we covered. Battery. AirPods Pro run about six hours with the hearing aid feature active, which is a morning, not a day. The occlusion effect, which is the one people underestimate, because when you seal the ear canal, the sound of your own voice has nowhere to go and it comes back through your skull, and it's loud and it's boomy and it makes you talk quieter, which breaks the conversation in a new way.



Corn

And the stigma.



Herman

Seventy-one percent of the trialists dropped it partly over stigma. Which is exactly Daniel's catch. Looking like you're ignoring people. You're sitting there with something in your ears and you have to explain it, or you don't, and then you're the person at the table who isn't listening.



Corn

What's worth trying, and what does it cost.



Herman

The bottom of the market is real. Cearvol Wave, three hundred and ninety-seven dollars a pair. Elehear Beyond, three ninety-nine. Yeasound RIC eight hundred, five hundred and forty-nine, and that's the one sitting at the top of the over-the-counter rankings. Then it climbs. Starkey Omega AI, three thousand two hundred and forty-eight. Phonak Audeo EON Sphere, four thousand five hundred and ninety-eight. Fortell, six thousand eight



Herman (continued)

hundred.



Corn

And the price difference in noise.



Herman

The Yeasound at five forty-nine scored two point four out of five in noise. The Fortell at six thousand eight hundred scored best in class. That's the spread. You can pay twelve times more and get something meaningfully better in exactly the scenario you care about, or you can pay five hundred and get something that's better than nothing in a quiet room.



Corn

Say the Consumer Reports line.



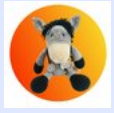
Herman

Kathleen Havelah's advice is to start using them the day you get them, because the trial period is the product. Not the first day in your kitchen. The first day in the loud restaurant, so you find out inside the window whether it works, and use the trial to test the customer support as well, because that's the bit that fails silently after you've paid.



Corn

So the answer to what's worth trying is a five hundred dollar pair and a hard deadline.



Herman

That's the shape. Buy at the bottom, wear it in the worst room you've got, and if it doesn't earn its place in two weeks, send it back, because the thing that made the AirPods study interesting is exactly the thing that will make you send them back.



Corn

There's one more piece I want, which is the oldest one. Has anybody looked at what's happening in the ear itself, not the brain. Because everything we've said assumes the hardware's fine.



Herman

There's a twenty twenty-five paper that says the hardware can be fine and not fine. They looked at middle-aged adults with normal audiograms and found cochlear neural degeneration predicting speech-in-noise deficits and higher listening effort, measured through pupil dilation, even when the behavioural scores matched.



Corn

So the score looks the same and the effort is different.



Herman

And that reframes the whole category question, because it means two people with identical audiograms and identical QuickSIN scores can be doing completely different amounts of work to get there. One of them is coasting and one of them is grinding, and the test reports the same number.



Corn

Which is what it feels like from the inside. The conversation isn't hard because you can't hear it. It's hard because holding it costs something.



Hilbert

Corn. Can I ask you something.



Hilbert

All this time you've been talking about speech in noise. Have either of you ever actually sat in a room with a person who couldn't hear you and had to keep going anyway.



Corn

I've sat in that room.



Hilbert

I did it for four days in a hotel in Ashkelon. This is a while back. The man's name was Yossi, he was a rep for a company that made acoustic panels, and he had what he called a workaround. He didn't wear an aid. He carried a piece of cardboard about the size of a paperback, folded in half, and he'd hold it behind his ear at the back, like this, at about forty-five degrees, and it caught what he called the second bounce off the wall and threw it back at him.



Corn

Cardboard.



Hilbert

He called it his reflector. He had three of them. One was laminated. He said the laminated one was for restaurants.



Corn

What did the panels do.



Hilbert

They were fine. That's not the part. The part is that he taught a course on it. Eight people, Tuesday mornings, and he stood at the front with the reflector in one hand and explained that the industry sells you a device when what you actually need is to know which direction the wall is. I sat in the back for all of it. Twice. The second time was because he asked me to hold the door.



Corn

Did it work.



Hilbert

The reflector. He could hear the questions from the back of the room. He couldn't hear the questions from the front-left corner. He knew which corner it was. He'd marked it on the floor with tape.



Herman

Tape on the floor.



Hilbert

Blue tape. He said the previous tenant had marked it too, which I never got to the bottom of. He charged two hundred and forty shekels for the course and gave you the reflector as part of it. Mine's in the car.



Herman

You kept it.



Hilbert

I kept it. It's not a hearing aid. It's a piece of cardboard with a crease in it. But here's the piece that stayed with me. He ran the entire business out of a room he rented from a dentist, and he did it for nine years, and when I asked him why he'd never gone and gotten an actual aid, he said the last time he priced one, the man wanted two thousand and then wanted him to come back three times, and the reflector was two hundred and forty and he could make another one in a kitchen.



Corn

That's the whole dropout problem in one sentence.



Hilbert

I don't know about the whole. That's what Yossi said.



Herman

The thing I take out of that is the return visits. Four days of Yossi holding a piece of cardboard and what he'd actually bought was not having to go back three times to a man who wanted two thousand shekels.



Corn

And the number I take out is two hundred and forty. In a category where we just said the floor is three ninety-seven.



Herman

And the man built his own for two hundred and forty with a crease down the middle.



Corn

We should close this properly, because I think where we landed is not where I expected.



Herman

Say it.



Corn

The category doesn't fit the user. The over-the-counter aid was written for perceived mild-to-moderate loss and the person who needs it most has a normal audiogram. But the AirPods study showed a real five decibel gain in exactly that population, and seventy-one percent of them handed it back. So the failure wasn't the technology. It was that a real benefit wasn't big enough to survive the wearing of it.



Herman

And the quiet versus noise gap doesn't close with money. The five hundred and forty-nine dollar pair and the six thousand eight hundred dollar pair both perform better in a quiet living room than a café, because a café is the unsolved problem at every price point.



Corn

The one thing I'd want a listener to take out of this is the test. QuickSIN. Three minutes, no booth, and it turns a feeling into a number, and the number is the only thing that gets you taken seriously.



Herman

Mine is smaller. The stigma isn't a joke and it isn't a preference. It's a measured exit reason. If a device helps and you still take it out, that's not you failing at the device.



Corn

We're past time, so. Hilbert, thank you for producing, and for the reflector.



Herman

For the producing.



Corn

The research is going toward lower latency and harder separation, and the honest answer is that the people who need it most are the ones nobody has studied yet. Somebody should run the trial.



Herman

If you want more of this, try episode ten, How ASR Went From Frustration To … Whisper Magic; episode fifty-seven, From Lawyers in Limousines to Developers in Their PJs; and episode seven, Building Custom ASR Tools. This has been My Weird Prompts. If you want to leave us a review, that helps other people find the show.



Corn

We'll be back soon.

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